EXPLANATION OF SIGNIFICANT DIFFERENCES #4
for
MIDCO II SUPERFUND SITE
GARY, INDIANA
EPA ID: IND980679559

2015

LIST OF ACRONYMS AND ABBREVIATIONS

AWQC	Ambient Water Quality Criteria
CALs	cleanup action level
CD	Consent Decree
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CRG	cumulative lifetime carcinogenic risk
ELCR	excess lifetime cancer risk
EPA	U.S. Environmental Protection Agency
ESD	Explanation of Significant Differences
HI	hazard index
IC	institutional control
IDEM	Indiana Department of Environmental Management
IRIS	Integrated Risk Information System
MCLs	Maximum Contaminant Levels
MNA	Monitored Natural Attenuation
mg/kg	milligrams per kilogram
MRC	Midco Remedial Corporation
NCP	National Contingency Plan
NCRG	cumulative non-carcinogenic hazard index
PAHs	polyaromatic hydrocarbons
PCBs	polychlorinated biphenyls
RI	Remedial Investigation
ROD	Record of Decision
site	Midco II Superfund site
SOW	Statement of Work
SVE	soil vapor extraction
SVOCs	semi-volatile organic compounds
TCE	1,1,1-trichloroethane
µg/L	micrograms per liter
VOCs	volatile organic compounds

I. INTRODUCTION TO THE SITE AND STATEMENT OF PURPOSE

The U.S. Environmental Protection Agency (EPA) is issuing this Explanation of Significant Differences (ESD) for the Midco II Superfund site (site) in Gary, Indiana, pursuant to Section 117(c) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and Section 300.435(c)(2)(i) of the National Contingency Plan (NCP).

EPA serves as the lead agency for CERCLA enforcement at the site and the Indiana Department of Environmental Management (IDEM) serves as the support agency.

The selected remedy for the Midco II site is documented in the following decision documents:

- Record of Decision (ROD) - June 30, 1989
- ROD Amendment - April 13, 1992
- ESD #1 - January 9, 1996
- ESD #2 - November 2, 1999
- ESD #3 - September 30, 2004

An ESD is appropriate when the lead agency determines that the remedial action at a site differs significantly in scope, performance or cost from the selected remedy, but the change to the remedial action does not fundamentally alter the selected remedy.

The purpose of this ESD is to modify the selected remedy for the Midco II site as follows:

1. update the contaminants of concern that are subject to groundwater cleanup based on a statistical comparison of site-related data to background data (upgradient/side-gradient) for inorganic contaminants;
2. add 1,4-dioxane as a groundwater contaminant of concern due to detections of this contaminant at the site;
3. temporarily shutdown the groundwater pump-treat-injection system to allow a pilot study to evaluate the viability of Monitored Natural Attenuation (MNA) as an alternate groundwater remedy;
4. add a two-foot cover to residually-contaminated sediments based on an assessment of the risks; and
5. include the City of Gary, Indiana, ordinance prohibiting groundwater use for drinking purposes as an additional institutional control (IC) for the site.

This ESD will become part of the Administrative Record file for the site, in compliance with Section 300.825(a)(2) of the NCP. The Administrative Record for the Midco II site is available for public review at the following locations:

The City of Gary Public Library
220 West 5th Street
Gary, Indiana 46402

EPA, Region 5
Superfund Records Center
77 W. Jackson Blvd., 7th floor
Chicago, Illinois 60604

II. SITE HISTORY, CONTAMINATION, AND SELECTED REMEDY

Site Description

The Midco II source area occupies approximately seven acres of sandy soil and fill located at 5900 Industrial Highway in Gary, Indiana, but the fence has been extended to enclose a few additional acres, including areas of contaminated groundwater, contaminated ditch sediments, and treatment and support buildings. The Midco II site is located in an urbanized and industrial area approximately 1.14 miles south of Lake Michigan and 0.75 miles north of the Grand Calumet River (see Figure 1).

The original ridge and swale topography at the site has been extensively disturbed by filling and grading (see Figure 2). The Midco II property was filled in with industrial wastes to create a relatively flat surface during the 1950s and 1960s. East and north of the site, remnants of some of the original ridge and swale topography are present. Midco II is bordered by a former auto salvage yard on the northwest, a ditch and railroad right-of-way on the northeast, vacant filled-in land now owned by the Gary-Chicago Airport Development Zone on the southeast, and Industrial Highway on the southwest (see Figure 2). The Gary/Chicago International Airport is located across Industrial Highway from Midco II. The Midco II property has been included in the Airport Authority's long-term development plans. The ditch bordering the northeast boundary of the site drains into the Grand Calumet River approximately 2 miles southeast of Midco II. There are several houses near the corner of Clark Street and Industrial Highway, about 1 mile southeast of Midco II, and the nearest residential area starts about 1 mile southeast of Midco II on the other side of the Grand Calumet River in Gary.

The Midco II site contaminated the shallow aquifer, the Calumet aquifer, which consists predominantly of fine sand and extends from about 8 to 50 feet below ground surface at Midco II. The Calumet aquifer is underlain by approximately 45 feet of soft silty clay and silty clay loam and 6 feet of hard silty till. The City of Gary prohibited use of water from the Calumet aquifer as a potable water source through an ordinance dated September 20, 2007. The predominant source of residential and industrial water in the Midco II area is Lake Michigan. If no action had been taken at the site, it is possible that contaminated groundwater from Midco II would have migrated into the Grand Calumet River and possibly into Lake Michigan.

History of Contamination

During the summer of 1976, waste operations at Midco II were initiated. Operations included temporary bulk liquid and drum storage of waste and reclaimable materials, neutralization of acids and caustics, and on-site disposal of liquids via dumping into pits, which allowed seepage of liquids into groundwater and the ditch. One of these pits, called the "filter bed," had an overflow pipe leading into the ditch. By April 1977, approximately 12,000 to 15,000 55-gallon drums of waste materials were stored at the site. In addition, there were 10 above- and below-ground storage tanks used to store liquid wastes. On August 15, 1977, a major fire at Midco II destroyed equipment and buildings, and damaged or burned out an estimated 50,000 to 60,000 drums.

Early Response Actions

In August 1981, EPA installed a 10-foot high fence around Midco II. In two separate removal actions during 1984 and 1985, EPA removed all of the drums, tanks, and surface wastes. Also in 1985, EPA excavated contaminated soil and material from the sludge pit and filter bed, which were highly contaminated by polychlorinated biphenyls (PCBs) and cyanide. The sludge pit and filter bed contents were temporarily contained on-site, and subsequently removed and disposed of off-site through a number of removal actions conducted between 1985 and 1989. EPA placed the Midco II site on the National Priorities List in June 1986.

Remedial Investigation

A group of generators who later formed the Midco Remedial Corporation (MRC) conducted the Remedial Investigation/Feasibility Study from 1985 through 1989. The groundwater table was found to be relatively flat at the Midco II site. Water level maps indicated a recharge area near the middle of the site (see Figure 3), with components of groundwater flow to the north, east, and south. The former auto salvage yard to the west of Midco II was located upgradient from the Midco II site.

During the Remedial Investigation (RI), high concentrations of volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), and cyanide were detected in source area soils and groundwater. Toluene, ethylbenzene, xylenes, and bis(2-ethylhexyl)phthalate were detected exceeding 100 milligrams per kilogram (mg/kg) in source area soils. Organic compounds detected in groundwater at concentrations exceeding Maximum Contaminant Levels (MCLs) in the source area groundwater included trichloroethylene, tetrachloroethylene, 1,1,1-trichloroethane, 1,1-dichloroethylene, 1,2-dichloropropane, trans-1,2-dichloroethane, vinyl chloride, benzene, toluene, ethylbenzene, xylenes, and bis(2-ethylhexyl)phthalate. Acetone, 2-butanone, and 4-methyl-2-pentanone were detected at concentrations exceeding 10 milligrams per liter. Except for benzene at monitoring well C-10, located in the northeast portion of the site, VOC, SVOC and cyanide contamination exceeding MCLs did not extend to the downgradient monitoring wells to the east or south of Midco II. However, benzene and bis(2-ethylhexyl)phthalate were detected exceeding MCLs in groundwater beneath the former junk yard upgradient from Midco II. The RI included an analysis of a comprehensive list of potential contaminants. Although 1,4-dioxane was not included in the groundwater evaluations of the RI, it was included in the monitoring during implementation of the selected remedy.

Additional monitoring wells were installed for the 1993 pre-design investigation, including new wells east of the C-cluster wells. The location of the site monitoring wells is depicted in Figure 4. In general, the 1993 investigation verified that the pattern of high VOC, SVOC, and cyanide concentrations in the Midco II source area did not reach the eastern and southern boundary wells, with the following exceptions:

- benzene had decreased to 2 micrograms per liter (µg/L) at C-10, but was detected exceeding its MCL (5 µg/L) at wells east and south of C-10 (30 µg/L at S-10; 52 µg/L at T-10);
- bis(2-ethylhexyl)phthalate was detected exceeding its MCL (6 µg/L) only at boundary well P-10 (58 µg/L) located at the south end of the site; and

- pentachlorophenol was detected exceeding its MCL (1 µg/L) only at wells U-10 (8 µg/L) and V-50 (6 µg/L).

Polyaromatic hydrocarbons (PAHs) were detected at concentrations greater than 1,000 µg/L in groundwater below the junk yard (located west and adjacent to Midco II). In 1993, PAHs were detected primarily in on-site wells.

PCBs were detected in a number of on-site soil samples at up to 41 mg/kg. PCBs were also detected in source area groundwater at C-10 and in junk yard groundwater west of the site.

The only pesticides detected in on-site soil samples were 4,4-DDE (0.026 micrograms per kilogram in one sample) and chlordane (in two samples at up to 0.62 mg/kg). The only pesticide detection in groundwater was heptachlor epoxide (0.22 µg/L at D-10). In 1993, dieldrin was detected only at one boundary well (0.0051 µg/L at T-10).

High concentrations of metals were detected in on-site soils and soils in the junk yard west of Midco II, including concentrations in the range of 100 mg/kg of arsenic, barium, copper, chromium, lead, nickel, tin, vanadium, and zinc.

Metals in groundwater that exceeded MCLs in both on-site wells and in junk yard wells included arsenic, barium, cadmium, chromium, lead, and selenium. Metals that exceeded MCLs at downgradient boundary wells south and east of the site included arsenic, barium, chromium, lead, mercury, and selenium. Metals that did not have MCLs at the time of the RI but whose maximum concentrations in on-site wells exceeded parameter-specific cleanup action levels (CALs) included: beryllium (up to 13 µg/L, CAL=4 µg/L); copper (up to 6,060 µg/L, CAL=120 µg/L); manganese (up to 12,700 µg/L, CAL=6,470 µg/L); mercury (0.38 µg/L, CAL=0.25 µg/L); nickel (up to 16,600 µg/L, CAL=647 µg/L); silver (up to 60 µg/L, CAL=4.6 µg/L); and thallium (up to 172 µg/L, CAL=3 µg/L). During the pre-design investigation, the maximum detections of cobalt, copper, and iron were found at upgradient wells (cobalt and copper at L-30; iron at K-30), and the maximum iron, manganese, and mercury detections were found at boundary well MW-3D. Thallium was detected exceeding its CAL in on-site wells and in boundary well S-50. Antimony and mercury were detected exceeding CALs only in boundary monitoring wells (antimony at U-50; mercury at Q-50, V-50, P-50, and N-50).

In addition to hazardous substances, the RI indicated that the aquifer at Midco II contained high concentrations of sodium, potassium, chloride, and total dissolved solids. Based on soil boring and test pit observations, this contamination was associated with an aluminum-rich, gray, cake-like waste material. It was theorized that this waste was used as a fill material at Midco II and nearby properties prior to the Midco II operations.

Sediments in the ditch north of Midco II were found to contain high concentrations of cyanide, VOCs, SVOCs, PCBs, and chlordane.

EPA's Selected Remedy

EPA issued a ROD in 1989 defining EPA's selected remedy for the site. The ROD was later amended in 1992 and subsequently modified by ESDs in 1996, 1999, and 2004. The current selected remedy for the Midco II site includes the following components:

- Excavation of contaminated sediments and underlying soils in defined wetland areas to achieve CALs for soils and sediments, with consolidation of the excavated sediments and soils on Midco II;
- Construction, operation, maintenance, and monitoring of a groundwater pump-treat-injection system to contain contaminated groundwater, and to achieve groundwater CALs. There are no CALs for chloride, sodium, potassium or total dissolved solids, as cleanup of the contamination from the salt was not required;
- Construction, operation, maintenance, and monitoring of a deep underground injection well for disposal of the treated groundwater;
- Treatment of contaminated soil within the waste disposal area by soil vapor extraction (SVE) to achieve at least a 97 percent reduction in VOCs;
- Excavation or solidification/stabilization of the soil most highly contaminated by metals and cyanide; and
- Construction of a final cover, with access restrictions, deed restrictions, and monitoring.

The groundwater CALs are defined as the most stringent of the following limits, subject to the exceptions listed below:

- MCLs;
- A concentration that would result in a cumulative lifetime carcinogenic risk (CRG) of 10^{-5} due to residential water usage;
- A concentration that would result in a cumulative non-carcinogenic hazard index (NCRG) of 1.0 due to residential water usage; and
- 3.9 times the Ambient Water Quality Criteria (AWQC).

The procedures for calculation of CRG and NCRG values were included in the 1992 ROD Amendment and the Statement of Work (SOW) included as Appendix I of the 1992 Consent Decree (CD) for the site. The objective of the MCL, CRG, and NCRG values is to clean up and protect groundwater for residential water usage, and the objective of 3.9 times the AWQC is to protect aquatic life in nearby surface water from recharge by contaminated groundwater. Exceptions to using the most stringent of the values described above include the following:

- If only one constituent is detected in groundwater at a concentration that is calculated to exceed the CRG, and an MCL has been promulgated for that constituent, then the MCL or 3.9 times the AWQC, whichever is less, will be the CAL and that constituent will not be included in the CRG calculation;

- The CAL cannot be less than the background concentrations or the analytical detection limits; and
- Contaminants detected below background concentrations will not be included in the CRG or NCRG calculations.

To aid in tracking cleanup progress, performance monitoring data in the annual groundwater monitoring reports is routinely compared to parameter-specific CALs using the procedures defined in the 1992 ROD Amendment and the CD. The parameter-specific CALs are listed in Table 1.

Site-specific background concentrations (if any) of VOCs, SVOCs, inorganics, pesticides, and PCBs were measured and were identified in the 1992 ROD Amendment[1] and CD[2]. For cyanide and organic compounds, background concentrations were defined as the 95 percent upper confidence limit of the average of data from 20 private wells located within 3 miles of the Midco II site. It was expected that MW-8 and monitoring well clusters J, K, and L would be background wells, but significant contamination was detected in each of these wells. The shallow aquifer has been somewhat degraded in the general vicinity of the site. Parameter-specific CALs were determined for each contaminant of concern and were included in the 1992 ROD Amendment. EPA attempted to define CALs and require monitoring for a comprehensive list of contaminants, but no CAL was defined for 1,4-dioxane.

The selected remedy provides that the groundwater pump-and-treat and injection system (also known as the pump-treat-injection system) must continue to operate until hazardous substances are reduced to below the CALs in all portions of the Calumet aquifer affected by the site or Midco operations. The CD requires that the pump-treat-injection system operate until hazardous substances have been reduced below CALs for a period of three consecutive years (unless EPA grants a petition on technical impracticability).

Construction and Operation of Remedy

In 1992, the parties who later formed MRC reached an agreement with EPA and the State of Indiana to implement the selected remedy at Midco II. Continuous operation of the pump-treat-injection system was initiated in February 1997. Because the pumping system could not achieve the target groundwater capture zone, the pumping system was expanded in 2001 by adding one additional pumping well (EW7) and increasing pumping rates. The expanded system started continuous operation in January 2002. Operation of the pump-treat-injection system continued until September 2010, when the system was temporarily shutdown. Temporary shutdown of the system was approved so that groundwater monitoring could be performed under non-pumping conditions to allow the evaluation of MNA as a potential alternate remedy for site groundwater.

From October 2003 through January 2006, MRC completed installation and shakedown testing of the SVE system, and operation of the system started in February 2006. MRC operated the

[1] Table 1 of Appendix II of the 1992 ROD Amendment
[2] Table 1 of Attachment 2 to the SOW in the 1992 CD

SVE system until May 2013, when it was shutdown more than three years after achieving the 97 percent reduction in VOCs required by ESD #3.

Performance Monitoring Results

Soil Vapor Extraction System

The SVE system operated and performed successfully. Based on emission data, about 14,000 pounds of VOCs were removed by the SVE system, and the system achieved the required 97 percent reduction in VOCs in soils by October 2009. Although reaching the performance standard specified in ESD #3, the SVE system continued operation until May 2013. Groundwater data indicated that VOC concentrations had been effectively reduced in the zones where the SVE system operated, but groundwater sampling in 2010 continued to identify elevated VOCs in the southern area of the site (at EW-2). MRC performed Geoprobe sampling, installed additional monitoring wells to better investigate the extent of this contamination, and expanded the SVE system to treat groundwater in this area until shutdown of the SVE system in 2013.

Groundwater Capture Zone

Prior to the 2001 expansion of the groundwater pumping system, capture zone evaluations did not demonstrate achievement of the target capture zone, although further off-site migration of groundwater contamination was not detected. Modeling indicated that the expanded pump-treat-injection system achieved the target capture zone, as shown in Figure 5.

Groundwater Monitoring

Annual groundwater monitoring events have been conducted at the site since 1996. The annual groundwater monitoring reports are included in the Administrative Record for the site.

III. BASIS FOR ESD #4

This section summarizes the basis for the five significant differences from the selected remedy addressed in this ESD.

Update the Contaminants of Concern that are Subject to Groundwater Cleanup Based on Statistical Comparison for Inorganic Contaminants

The 2004 *Five-Year Review Report* recommended that the monitoring network and pumping system not be expanded to include all of the antimony, arsenic, barium, iron, and selenium contamination detected at the boundary wells because groundwater at these wells probably was being affected by off-site or area-wide contamination. In 2004 and 2008, MRC conducted a review of the frequencies of detections exceeding CALs and the maximum detections for these inorganic contaminants. The 2009 *Five-Year Review Report* reported an off-site, or background component, for arsenic, barium, sulfide, iron, and thallium contamination and that the antimony, manganese, and selenium contamination appear to be focused off-site. As previously mentioned, the RI showed that the former junk yard property adjacent to the western boundary of Midco II

has soil and groundwater contamination, including benzene, toluene, ethylbenzene, xylene, PAHs, and PCBs. In addition, the fill used in the area of Midco II caused some groundwater contamination, including high sodium, potassium, chloride, and total dissolved solids. Because of these and subsequent observations, EPA, IDEM, and MRC conducted statistical evaluations comparing near-site background to site-related groundwater data outside the source area using groundwater datasets from 2005-2010. The resultant report, *Background Groundwater Statistical Analyses Report for Inorganic Constituents Exceeding Carcinogenic and Non-Carcinogenic Risk Screening Criteria, Midco I and II Sites, Gary, Indiana, 2005 to 2010* (January 13, 2012), summarizes the evaluations and is included in the Administrative Record.

The 2012 Report provided multiple lines of evidence that inorganic exceedances outside the source area are attributable to offsite sources or background conditions. The evaluation conducted by MRC focused on comparison of site data to background conditions. For most constituents, the frequency of exceedances of groundwater CALs was comparable or greater in background wells compared to site wells.

The 2012 Report contains considerable detail about the statistical analysis that was conducted and includes data tables and figures (including all the individual dot plots for each constituent). Interested readers should refer to that document for more detailed information. Based on that analysis, the following nine inorganic constituents will be excluded from well-by-well cumulative risk calculations at the Midco II site: arsenic, barium, cadmium, chromium, manganese, mercury, thallium, vanadium, and iron.

Monitoring for the inorganic constituents listed above will continue as part of routine site monitoring. However, the constituents listed above will be excluded from cumulative risk calculations, as defined in the SOW attached to the CD, for purposes of determining whether any given well at the Midco II site is in compliance with the CAL. Following receipt of new groundwater monitoring data, the statistical comparisons between site-related and background inorganic datasets will be updated using data from the three most recent sampling events.

EPA made the decision to exclude the inorganic constituents listed above from the required compliance calculations in 2010, concurrent with giving MRC approval to temporarily shutdown the groundwater pump-treat-injection system, but prior to this ESD it was not documented in a decision document.

Add 1,4-Dioxane as a Groundwater Contaminant of Concern

Although there is no record of 1,4-dioxane being stored or disposed at the site, it is likely that it was present as a stabilizer for 1,1,1-trichloroethane (TCE), which was one of the solvents disposed at Midco II. The contaminant 1,4-dioxane often persists longer and migrates farther in groundwater than other VOCs.

EPA updated the carcinogenicity assessment for 1,4-dioxane in the Integrated Risk Information System (IRIS) on August 11, 2010, and characterizes 1,4-dioxane as "likely to be carcinogenic to humans." To date, IRIS does not include an assessment of carcinogenicity through inhalation of 1,4-dioxane.

Based on the above information, and due to the fact that it has been detected in groundwater at the Midco II site, 1,4-dioxane will be added to the list of parameters to be monitored in groundwater and will be subject to a CAL. The CAL for 1,4-dioxane will be established in accordance with the protocol defined in the 1991 ROD Amendment and in the SOW attached to the CD.[3]

Temporarily Shutdown the Groundwater Pump-treat-injection System to Evaluate the Viability of MNA as an Alternate Groundwater Remedy

The current groundwater remedy at Midco II is groundwater extraction, treatment, and injection well disposal, which is required to remain in place until CALs have been achieved for three consecutive years. The SOW allows submittal of a petition for a technical impracticability waiver and revision of CALs following 10 years of operation of the groundwater remedy.

The implemented groundwater remedy has resulted in decreased concentrations of organic and inorganic constituents in groundwater in both the source area and immediately downgradient of the site. In September 2010, EPA allowed MRC to temporarily shutdown the existing groundwater pump-treat-injection system to evaluate, in conjunction with the remedy components and contingency measures discussed below, the viability and effectiveness of MNA to address the remaining groundwater contamination at the site. The following site factors supported the temporary shutdown of the groundwater pump-treat-injection system in 2010:

- The SVE system that operated within the source area achieved shutdown criteria in 2009 (and was subsequently shutdown in May 2013);
- Substantial reductions in leaching risk between 1998 and 2009 indicate no remaining source soils that require excavation, per the criterion identified in ESD #3;
- Copper, cyanide, hexavalent chromium, and heptachlor epoxide AWQC CAL exceedances are addressed with a change of the surface water receptor. A ditch located north of Midco II was the former surface water receptor. This ditch is being covered by the final Site cap. The Grand Calumet River is now the surface water receptor;
- Remaining sulfide concentrations are explained by native site groundwater geochemistry;
- Residual VOCs identified in the vicinity of extraction well EW2 were expected to be effectively treated by the then-proposed expansion of the SVE system without requiring operation of the pump-treat-injection system;
- Localized cyanide occurrence in the immediate vicinity of well MW-1 will be treated by in-situ application of hydrogen peroxide during implementation of the Midco II Site Closure Plan; and
- No indication of organic or inorganic constituents related to the Midco II source area had been observed above background concentrations in the immediate-downgradient areas

[3] This ESD does not specify the numerical value for the 1,4-dioxane CAL but rather the protocol that will be followed to calculate the CAL. Because this ESD removes a number of inorganic constituents from the required CAL calculations, and because those calculations consider *cumulative* risks and hazards, the CAL for 1,4-dioxane will be calculated based on the results of the 2015 groundwater monitoring event.

over three annual groundwater monitoring events (2008, 2009, 2010), with the exception of low-level benzene (well D-10), pesticides (north site area), trace or residual VOCs (wells MW-4D, F-30, and N-10), and hexavalent chromium (well R-50).

The groundwater monitoring data from 2008-2010 showed some sporadic CAL exceedances for pesticides, benzene, hexavalent chromium, and trace VOCs. Fate and transport modeling for these exceedances was conducted based upon the December 2010 groundwater gradient data, established under non-pumping conditions after EPA allowed temporary shutdown of the groundwater pump-treat-injection system. Based on the modeling, none of the constituents detected above a CAL in the 2008 through 2010 monitoring period will migrate further than 500 feet beyond the site boundary and will not pose a risk to human health or the identified site receptors. It is acknowledged that some groundwater level rebound is still evident in the northern portion of the site. Monitoring is ongoing to continue to validate the groundwater gradient component of the modeling.

The final cover that will be constructed to limit infiltration will serve to isolate residual contamination within the former source area. Source control measures in the form of SVE for organic constituents and excavation of soil containing high levels of inorganic constituents have been or will be implemented prior to placement of the final cover. The groundwater pump-treat-injection system operated from February 1997 until its temporary shutdown in September 2010, reducing the overall concentration of groundwater contaminants within the former source area. These actions served to mitigate future dissolved-phase contamination within the former source area that may recur once water levels begin to rise in the absence of pumping.

Add a Two-Foot Cover to Residually-Contaminated Sediments

Residually-contaminated sediments remain in place in the former wetland areas previously excavated in 1993 pursuant to an Amendment to the CD. The 1993 action addressed potential ecological risks from sediments, natural resource damage claims, and wetlands mitigation. An updated residual human health risk evaluation was completed for the remaining sediments. Based on the residual risks to human receptors, EPA concluded that a two-foot barrier layer over the residually-contaminated sediments is necessary. Human health risks at or above the excess lifetime cancer risk (ELCR) of $1x10^{-5}$ and/or the non-cancer hazard index (HI) of 1.0 were found for various exposure scenarios, including the adolescent trespasser receptor ($3x10^{-5}$ ELCR), the site worker receptor ($2x10^{-4}$ ELCR), the adult residential receptor ($3x10^{-4}$ ELCR and HI=1), and the child resident ($8 x10^{-4}$ ELCR and total HI=12). The target organ-specific HIs for all contaminants were greater than 1 for the liver (HI=2), kidney (HI=2) and blood (HI=6). The primary contributors to the HI were arsenic, copper, iron, and vanadium. The cancer risk drivers were 3-methylcholanthrene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(a)anthracene, cobalt, manganese, and arsenic.

The Sediment Closure Plan for the Midco II site requires a soil cover over the residual sediments as follows: site preparation including vegetation removal and rough grading; placement of 18 inches of sand; placement of 6 inches of topsoil; and site restoration with appropriate facultative vegetation. However, because the residually-contaminated sediment area that requires a soil cover is relatively small and is located in very close proximity to the source areas of the

site that will be capped in accordance with the Midco II Site Closure Plan, EPA agreed with MRC's proposal to cap the sediment areas using the same final cover system that EPA approved for the rest of the site. The final site cover will occupy an area of 10.7 acres, including the residually-contaminated sediment area along the north site boundary. The sediment cover area is shown in Figure 6.

The construction of the final sediment cover system will begin with initial clearing and grubbing of sediment areas, taking care to remove only as much soil as required to remove the vegetation. The stripped soil will be segregated from vegetation and replaced on the excavation area prior to placement of the final cover system. The sediment areas will then be rough graded, as necessary, to provide a level sub-base elevation for the final cover system.

The final cover system, which is more robust than required by this ESD, will be comprised of a 40-mil high-density polyethylene geomembrane layer, a double-sided geocomposite drainage layer, 18 inches of a compacted clay protective layer, and 6 inches of a topsoil/rooting zone layer. Site restoration and vegetation will be completed after construction of the cover system. Vegetation will be restored to species types observed prior to construction activities.

Sediment and erosion controls for stormwater discharges from the sediment cover remedy construction activities will be implemented in accordance with applicable or relevant and appropriate requirements established in prior decision documents. A detention pond will be constructed in the northeast portion of the site, and stormwater will be collected in diversion swales along the perimeter of the cover and directed to the detention pond prior to leaving the site.

Include City of Gary Ordinance No. 7930 as an Additional IC

On September 27, 2007, the City of Gary, Indiana, issued an ordinance restricting groundwater usage. The ordinance prohibits drilling new potable water supply wells. For existing potable water supply wells, the property owners were required to disconnect from their private wells and connect to the City's piped water supply system within one year of the ordinance. In specific instances where it is not possible, feasible or practicable to connect to the City water supply system, any and all existing potable water, where drawn from the ground, must draw solely from a source located in the deeper, confined aquifer and not from a shallow, unconsolidated aquifer. All existing potable wells are required to be registered with the Building Department of the City of Gary. All existing potable wells shall be tested and meet the drinking water standards in order to be operated for potable water use. The ordinance requires that no person shall drill a well intended as a source of water for any non-potable use without having first registered with the Building Department of the City of Gary.

EPA has determined that the City of Gary Ordinance No. 7930, dated September 27, 2007, is included as one of the IC components required by the selected remedy at the Midco II site.

IV. DESCRIPTION OF SIGNIFICANT DIFFERENCES

Description and Discussion of the Differences

The selected remedy for the Midco II site before and after ESD #4 is compared in Table 2. The specific changes addressed by this ESD are summarized below.

Update the Contaminants of Concern that are Subject to Groundwater Cleanup Based on Statistical Comparison of Site-related Data to Background Data for Inorganic Contaminants

Based on statistical comparisons of site-related groundwater concentrations to background concentrations using the 2005-2010 groundwater data, the constituents in the table below will be excluded from well-by-well cumulative risk calculations at the Midco II site for the purpose of determining whether any given well is in compliance with the CAL.

Inorganic Constituents to be Excluded from Well-by-Well Cumulative Risk Calculations at Midco II		
Arsenic	Chromium	Thallium
Barium	Manganese	Vanadium
Cadmium	Mercury	Iron

Monitoring for the above contaminants will continue as part of the routine monitoring conducted at the site. Following receipt of new groundwater monitoring data, the statistical comparisons between site-related and background inorganic datasets will be updated using data from the three most recent sampling events.

Add 1,4-Dioxane as a Groundwater Contaminant of Concern

Available information indicates that 1,4-dioxane detections in groundwater are likely to be the result of the disposal of TCE at the Midco II site. This constituent is, therefore, being added as a groundwater contaminant of concern. EPA will assign a groundwater CAL to 1,4-dioxane. The CAL shall be the CRG calculated in accordance with the protocol defined in the 1991 ROD Amendment and in the CD's SOW. The toxicity factors shall be derived from IRIS. The current toxicity factors in IRIS include:

- An oral cancer potency factor = 0.1 $(mg/kg\text{-}day)^{-1}$; and
- A chronic oral reference dose = 9.6 mg/kg-day.

The oral adsorption factor used to determine the CRG will be 1.0. Use of these values is likely to result in a parameter-specific CAL equal to approximately 7 µg/L, according to EPA's current Regional Screening Tables.

Temporarily Shutdown the Groundwater Pump-treat-injection System to Evaluate the Viability of MNA as an Alternate Groundwater Remedy

The implemented groundwater remedy has decreased the concentrations of organic and inorganic constituents in groundwater in both the source area and immediately downgradient of the site. In September 2010, EPA allowed MRC to temporarily shutdown the existing groundwater pump-treat-injection system to evaluate the viability and effectiveness of MNA to address the remaining groundwater contamination at the site.

Additional monitoring is being conducted to more fully evaluate the effectiveness of MNA in addressing the remaining groundwater contamination at the site. Any decision to further modify the selected groundwater remedy for the site will be documented in an appropriate remedy selection decision document.

Add a Two-Foot Cover to Residually-Contaminated Sediments

Residually-contaminated sediments remain in place in the former wetland areas previously excavated in 1993 pursuant to an Amendment to the CD. The 1993 action excavated the more highly-contaminated sediments to address potential ecological risks, natural resource damage claims, and wetlands mitigation. An updated residual risk evaluation was completed for the residually-contaminated sediments, the results of which were described above in Section III of this ESD. Based on the residual risks to human receptors from the remaining sediments, a two-foot soil cover is needed for long-term management of the risks. This requirement is being addressed by the Sediment Closure Plan for the Midco II site.

Include City of Gary Ordinance No. 7930 as an Additional IC

The City of Gary Ordinance No. 7930, dated September 27, 2007, prohibits the use of groundwater as a drinking water source, the installation of wells, and the drilling of new wells to be used as a source of potable water; requires properties with existing private wells to be connected to the City water system, if possible; and requires non-potable water wells to be registered. The ordinance is selected as one of the ICs for the site.

<u>Expected Impacts of ESD</u>

The remedy changes described in this ESD are not expected to result in any substantial changes to the expected outcomes of the remedy, such as a change in the time to achieve groundwater cleanup objectives at the site. Some inorganic groundwater constituents no longer need to be included in the CAL compliance calculations (unless there is a future release from the source area), but those constituents will be included in the monitoring program. The constituent 1,4-dioxane is now a site-related contaminant of concern, but it has always been included in the site monitoring program.

EPA authorized the temporary shutdown of the groundwater pump-treat-injection system in 2010 to allow an evaluation of MNA for the remaining groundwater contamination. Since there are no significant exceedances of the current CALs outside the site boundary, temporary cessation of

the pump-treat-injection system is not expected to lengthen the time to achieve site cleanup objectives. The change to the sediment remedy will be implemented at the same time as implementation of the final soil cover for the site, and, therefore, does not extend the remedy construction schedule. The addition of the City Ordinance as one of the selected ICs at the site adds an additional layer of protectiveness to the controls in place at the site.

V. SUPPORT AGENCY COMMENTS

IDEM, as the support agency, has reviewed and supports the modifications to the remedy documented in this ESD. The State's February 2, 2015 concurrence letter is included as Appendix A.

VI. STATUTORY DETERMINATIONS

With the changes identified in this ESD, the Midco II remedy continues to comply with CERCLA Section 121. The remedy remains protective of human health and the environment, complies with the federal and state requirements which are applicable or relevant and appropriate to the remedial action, and is cost-effective. In addition, the modified remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable for this site. Since wastes will be left in place at the site above concentrations that allow for unlimited use and unrestricted exposure, five-year reviews will continue to be conducted to ensure that the remedy remains protective of human health and the environment, in accordance with CERCLA Section 121 and the NCP.

VII. PUBLIC PARTICIPATION COMPLIANCE

EPA will post a notice of issuance of this ESD in a local newspaper. An index of the updates to the Administrative Record supporting ESD #4 is attached as Appendix B. The Administrative Record for this ESD and other EPA decision documents are available for public review at the following locations:

The City of Gary Public Library
220 West 5th Street
Gary, Indiana 46402

EPA, Region 5
Superfund Records Center
77 W. Jackson Blvd., 7th floor
Chicago, Illinois 60604

Comments or questions regarding this ESD are invited and can be directed to either of the following individuals:

Pablo Valentín
EPA Remedial Project Manager
77 West Jackson Blvd.
Chicago, IL 60604
(312) 886-4740

Stephanie Andrews, Project Manager
Indiana Department of Environmental Management
OLQ/Federal Programs Section
100 N. Senate Ave.
Indianapolis, Indiana 46204
(317) 234-0358

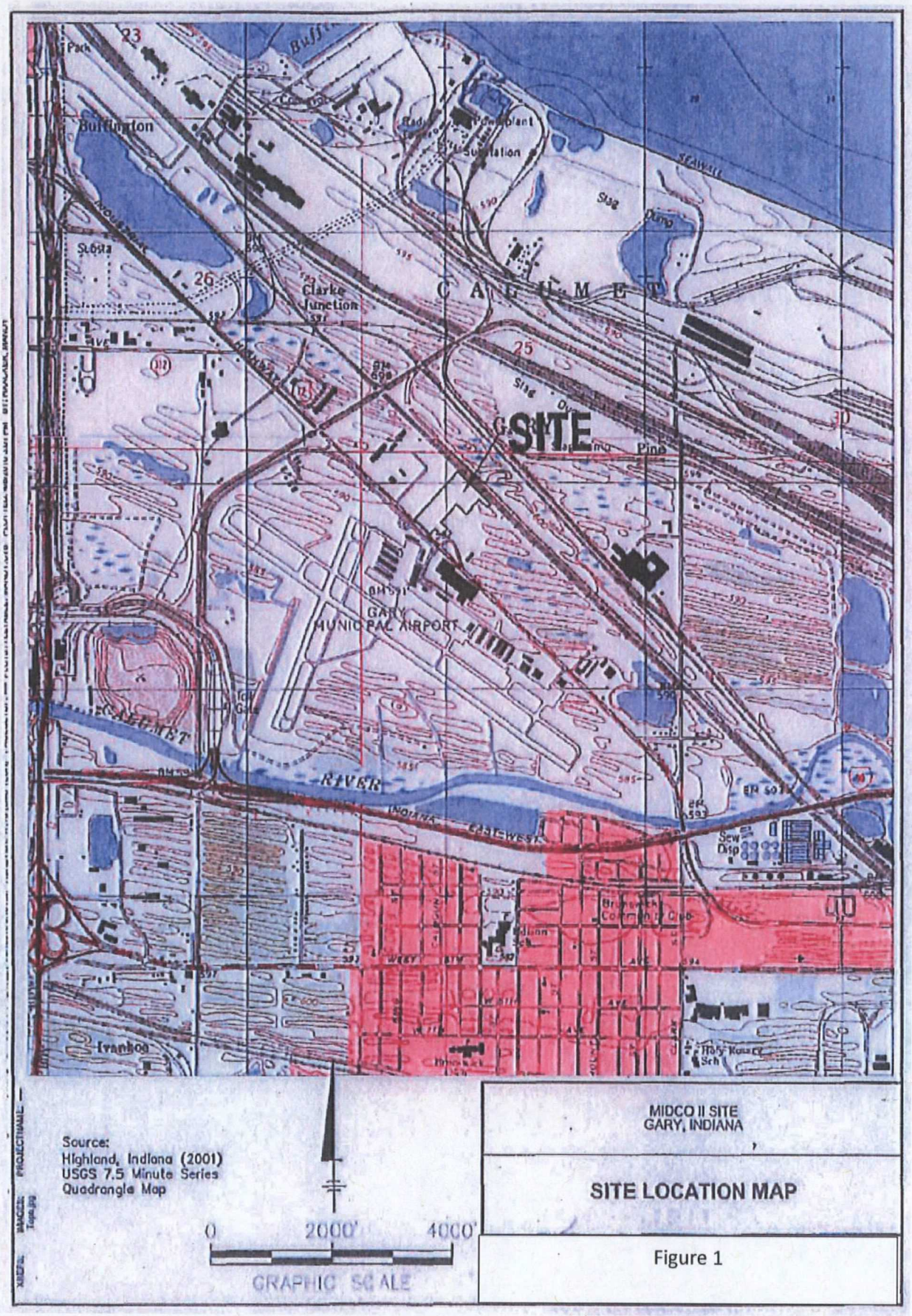
VIII. AUTHORIZING SIGNATURE

Approved by:

Richard C. Karl, Director
Superfund Division
U.S. Environmental Protection Agency, Region 5

7/24/15
Date

FIGURES


SITE
CALUMET
GARY MUNICIPAL AIRPORT
CALUMET RIVER
Burlington
Clarke Junction
Slosta
Pine
Ivanhoe
Source:
Highland, Indiana (2001)
USGS 7.5 Minute Series
Quadrangle Map
0
2000'
4000'
GRAPHIC SCALE
MIDCO II SITE
GARY, INDIANA
SITE LOCATION MAP
Figure 1

Drawn by: KR Approved by: [illegible] Date: [illegible]

Geosciences Research Associates, Inc.

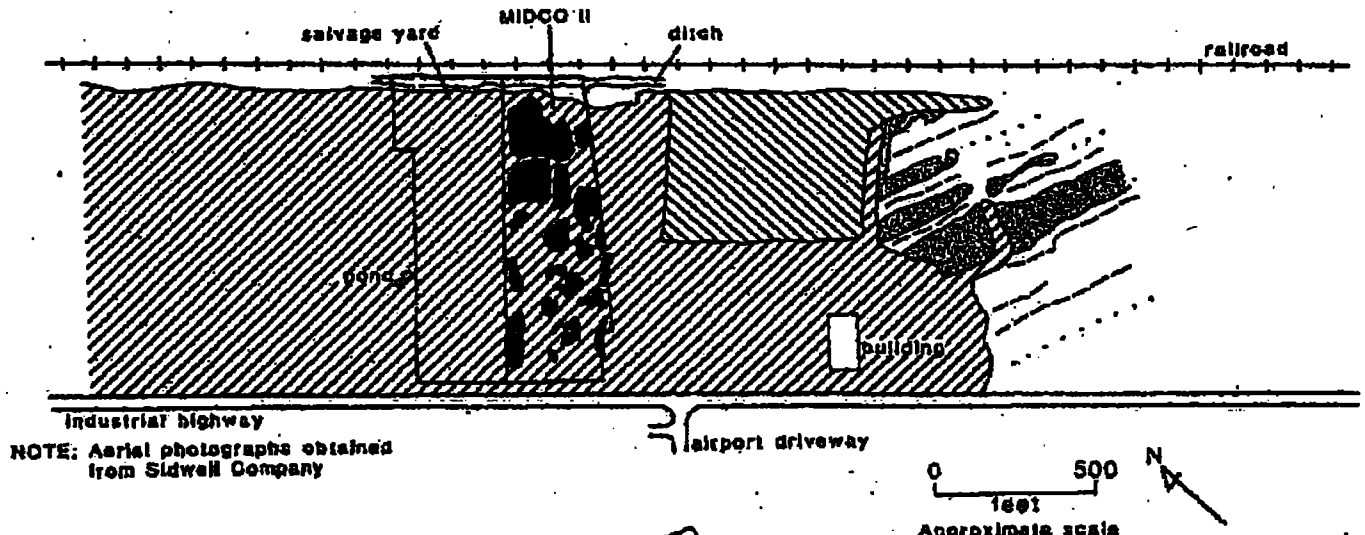


Figure 2

Sketch Map of Midco II Site and Vicinity

Conditions as interpreted from April 15, 1978 Aerial Photography

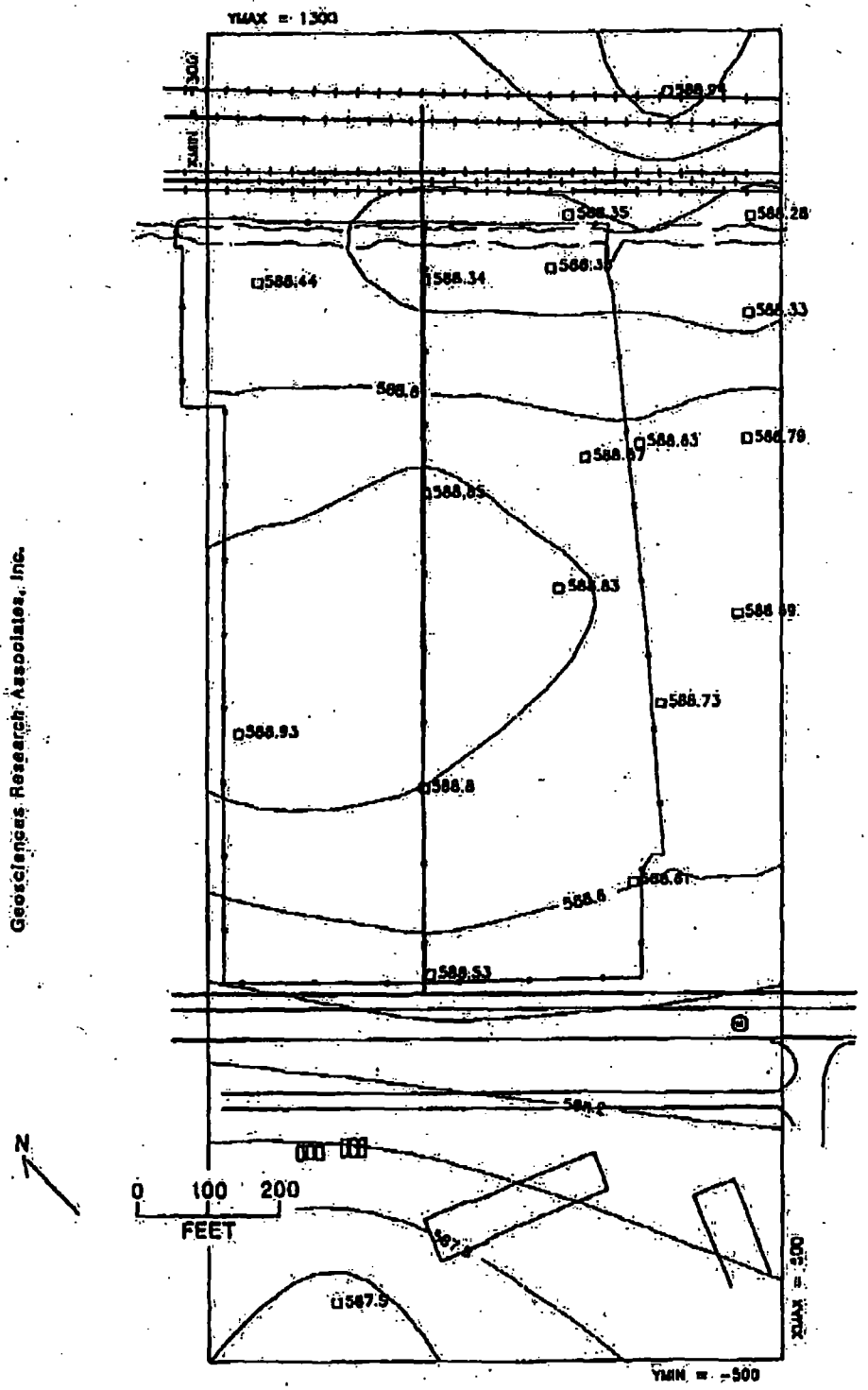


Figure 3

Midco II Average Groundwater Contour

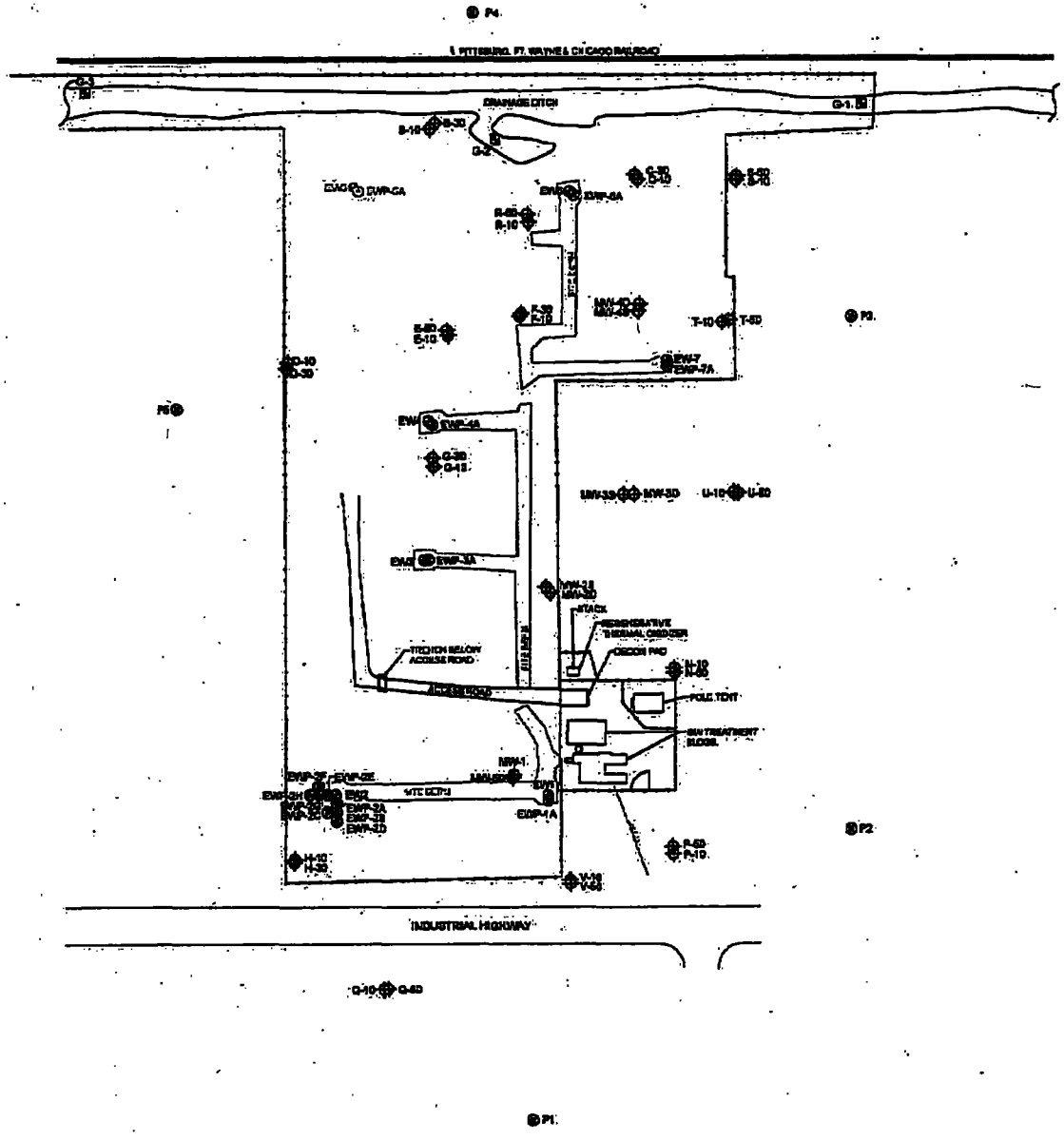


Figure 4

Well and Piezometer Locations
Midco II Site

Gary, Indiana

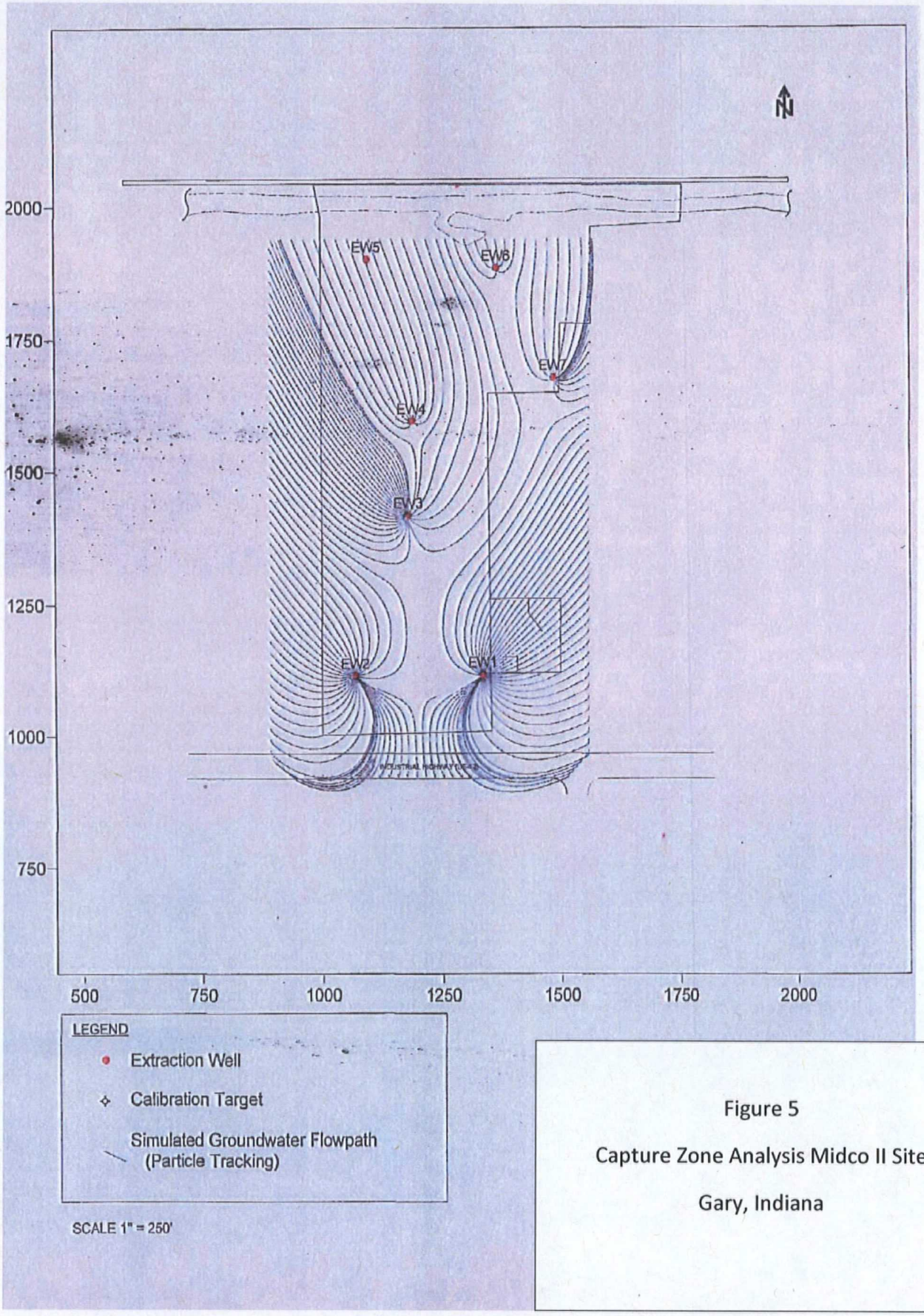
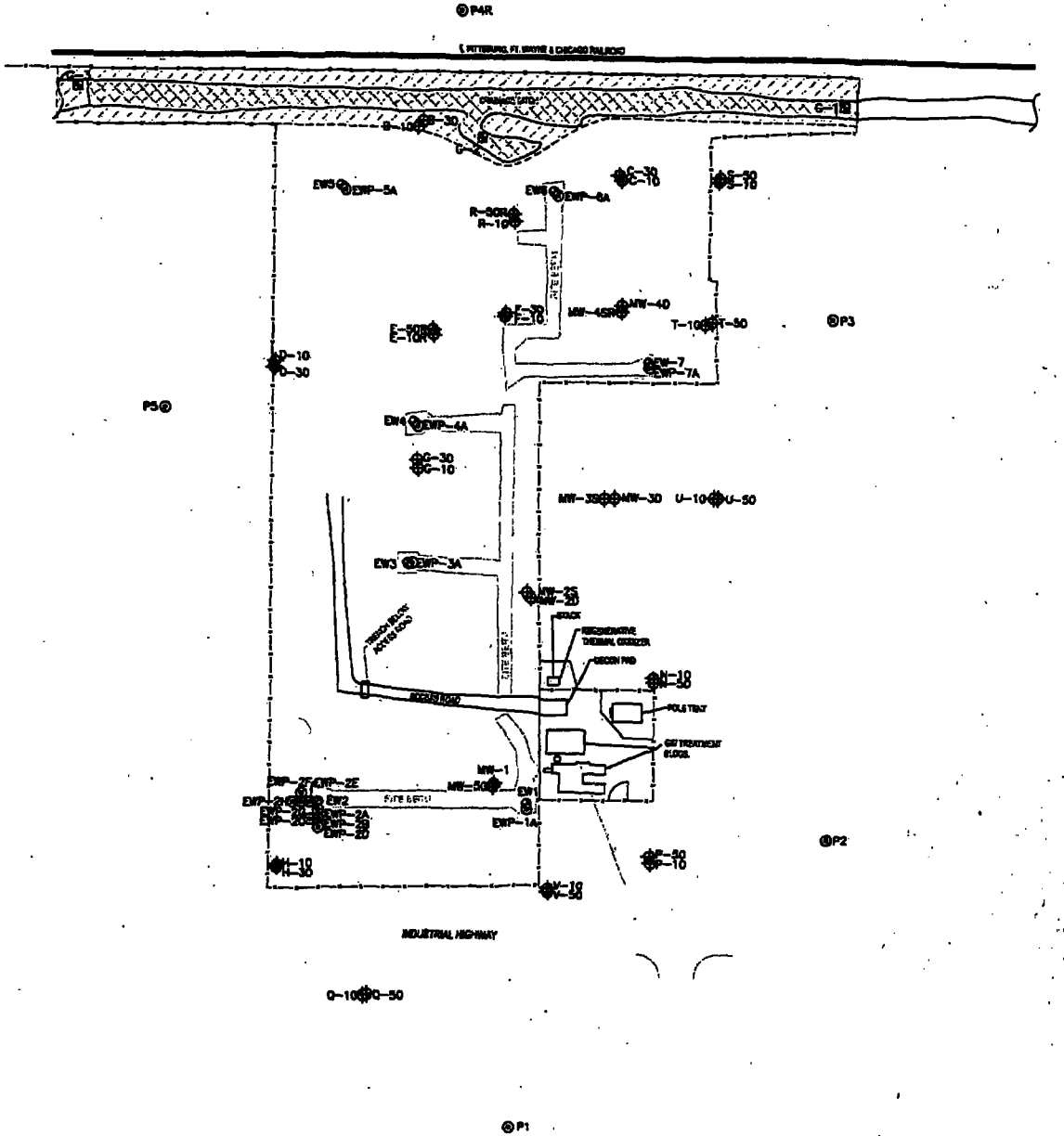
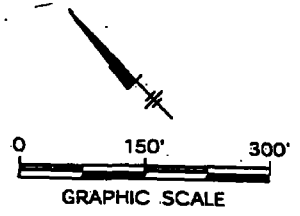


Figure 5

Capture Zone Analysis Midco II Site

Gary, Indiana





LEGEND

- FENCE
- MONITORING WELL LOCATION
- EXTRACTION WELL LOCATION
- PIEZOMETER LOCATION
- 1993 CONTAMINATED SEDIMENTS AREA
- PROPOSED SEDIMENT COVER AREA

Figure 6

Sediment Cover Areas

Midco II Site

Gary, Indiana

TABLES

TABLE 1

Parameter-Specific Clean-Up Action Levels[1]
Midco I and II Sites
Gary, Indiana

Parameter	Background		Project-Specific QL	MCL	AWQC x F		Risk-Based Carc.	Risk-Based Noncarc.	Parameter-Specific CAL[2]	
	Midco I	Midco II			Midco I	Midco II			Midco I	Midco II
Polychlorinated Biphenyls										
Polychlorinated biphenyl compounds	--	--	0.41	0.5	0.0546	--	0.0420	--	0.41	0.41
Polycyclic Aromatic Hydrocarbons										
Benzo(a)anthracene	--	--	0.2	--	--	--	2.81	--	2.81	2.81
Benzo(b)fluoranthene	--	--	0.2	--	--	--	0.0938	--	0.2	0.2
Benzo(a)pyrene	--	--	0.2	0.2	--	--	0.0281	--	0.2	0.2
Chrysene	--	--	0.2	--	--	--	2.81	--	2.81	2.81
Dibenzo(a,h)anthracene	--	--	0.2	--	--	--	0.0281	--	0.2	0.2
Indeno(1,2,3-cd)pyrene	--	--	0.2	--	--	--	2.81	--	2.81	2.81
Herbicides										
2,4-D	--	--	30	70	--	--	--	--	70	70
Dinoseb	--	--	1	7	--	--	--	--	7	7
2,4,5-TP (Silvex)	--	--	4	50	--	--	--	--	50	50
Inorganic Analytes										
Antimony	--	--	1	6	--	--	--	12.9	6	6
Arsenic	6	15.1	2	10	187	173	0.18	32.4	6	15.1
Barium	118	107	20	2,000	--	--	--	1,620	1,620	1,620
Beryllium	--	--	1	4	20.7	19.1	--	162	4	4
Cadmium	--	0.15	1	5	4.68	10.4	--	32.4	4.68	5
Chromium (III)	8	7.5	1	100	858	2,010	--	32,400	100	100
Chromium (VI)	8	7.5	10	--	42.9	39.6	--	162	42.9	39.6
Copper	--	25.2	1	--	50.7	120	--	--	50.7	120
Cyanide	10.4	158	10	200	20.3	18.7	--	647	20.3	158
Fluoride	--	--	100	4,000	--	--	--	--	4,000	4,000
Iron	3,880	15,300	50	--	3,900	3,600	--	--	3900	15,300
Lead	--	5.6	1	--	13.7	53.6	--	--	13.7	53.6
Manganese	1,400	464	25	--	--	--	--	6,470	6,470	6,470
Mercury	--	0.25	0.2	2	0.0468	0.0432	--	9.71	0.2	0.25
Nickel	58	12.3	7	--	655	1,580	--	647	647	647
Selenium	--	--	2	50	137	126	--	97.1	50	50
Silver	--	4.6	1	--	0.468	0.432	--	--	1	4.6
Sulfide	--	--	50	--	7.8	7.2	--	--	50	50
Thallium	--	--	1	2	156	144	--	227	3	3
Vanadium	4.33	--	1	--	--	--	--	227	227	227
Zinc	--	1,470	1	--	1,330	3,160	--	6,470	1,330	3,160

Notes:

MCL = Primary maximum contaminant level, from 40 CFR 141, as of July 2009
AWQC x F = Site-specific chronic ambient water quality criteria (AWQC), equal to the federal AWQC for protection of aquatic life times the site-specific factor F; from Table 2 of Attachment 2 of the Midco I and II Statement of Work, dated June 1992
Background = Site-specific background ground water concentrations; from Table 1 of Attachment 2 of the Midco I and II Statement of Work, dated June 1992
QL = Quantitation Limit
Carc. = Carcinogenic risk-based concentration equivalent to 1E-05 carcinogenic risk for the individual parameter
Noncarc. = Noncarcinogenic risk-based concentration equivalent to 1 noncarcinogenic hazard index for the individual parameter
CAL = Clean-up Action Level
-- = Value not specified or not calculated

[1] All concentrations are given in micrograms per liter.

[2] Lowest value between the MCL, AWQC, and the risk-based concentrations calculated as if the parameter was the only parameter detected in the sample, but not less than the project-specific detection limit or the site-specific background concentrations.

TABLE 2

Comparison of Midco II Selected Remedy Before and After ESD #4

AREA OF COMPARISON	BEFORE ESD #4	AFTER ESD #4
Contaminants of concern subject to well-by-well cumulative risk calculations for the purpose of determining whether any given well is in compliance with the CAL.	Constituents listed in Table 1.	The following constituents are excluded from well-by-well cumulative risk calculations: arsenic, barium, cadmium, chromium, iron, manganese, mercury, thallium, and vanadium.
New groundwater contaminants of concern.	N/A	1,4-dioxane is added as a contaminant of concern; CAL shall be calculated in accordance with protocol in 1991 ROD Amendment and CD.
Technology to clean up groundwater.	Pump and treat.	Pump-and-treat system temporarily shut down in 2010 to evaluate MNA as a potential groundwater remedy to address remaining groundwater contamination.
Technology to clean up soil below water table.	SVE to remove most VOCs in source area soil up to 12 feet below water table, and pump-and-treat to remove residual source area contamination and contamination outside of source area.	No change, but SVE was discontinued in 2013, more than three years after achieving required 97% removal rate.
Groundwater CALS.	CR = 1×10^{-5} NCRG = 1.0 MCLS AWQC x 3.9	No change.
Technology for groundwater disposal.	Deep well injection (or reinjection into the Calumet aquifer).	No change, but injection system temporarily shut down in 2010 concurrent with shutdown of pump-and-treat system.
Groundwater treatment requirements prior to deep well injection.	RCRA delisting criteria (6.3 times health-based levels).	No change.
Technologies to treat principal threats in soils above water table and accessible by localized dewatering.	SVE to treat VOCs and SVOCs, and either in-situ solidification/ stabilization (S/S) or excavation and off-site disposal for metals and cyanide.	No change, but SVE was discontinued in 2013, more than three years after achieving required 97% removal rate.

AREA OF COMPARISON	BEFORE ESD #4	AFTER ESD #4
Technology to address source area soil presenting a lower long-term health threat.	Site cover following SVE on entire source area.	No change.
Soil treatment action levels.	Treat all soils in defined area, or if sampling is conducted, treat grids where indicator of groundwater risk for a grid (GWR_g, as defined in earlier decision documents) exceeds 50.	No change.
Performance standard for SVE	97% reduction in VOCs.	No change.
Performance standard for in-situ S/S.	No S/S treatment required for SVOCs; 90-99% or concentration limit for metals based on synthetic precipitation leaching procedure (SPLP), except 500 µg/L for copper in SPLP; for cyanide, 40 µg/L concentration limit in SPLP.	No change.
Volume of soil treatment by SVE (above and below water table)	79,200 cubic yards.	No change.
Volume of soil treatment by in-situ S/S or volume of soil addressed by excavation and off-site disposal.	1,000 cubic yards (allowed maximum amount to be adjusted downward based on sampling results).	No change.
Technology to address contaminated sediments.	Excavation, consolidation in source area, and cap.	Cap in place with multilayer cover over residual sediments remaining in sediment excavation areas.
Soil/ sediment CALs applying to sediment excavation.	CR = 1×10^{-6} NCRG = 1.0	No change
Air emissions performance standard.	3 pounds/hr; CR = 10^{-7} for each emission source to nearest receptor.	No change.
Site cover specifications.	Comply with RCRA Subtitle C closure requirements.	No change.
Access, deed restrictions, long-term monitoring.	Required.	Still required, but adding City of Gary ordinance as an additional IC.

APPENDIX A

State Concurrence Letter

INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
We Protect Hoosiers and Our Environment.
100 N. Senate Avenue • Indianapolis, IN 46204
(800) 451-6027 • (317) 232-8603 • www.idem.IN.gov

Michael R. Pence
Governor

Thomas W. Easterly
Commissioner

February 2, 2015

Ms. Joan Tanaka
USEPA Region 5
77 West Jackson Boulevard
Mail Code SR-6J
Chicago, IL 60604

Dear Ms. Tanaka

Re: Explanation of Significant Differences #4,
Midco II Superfund Site, Gary, Indiana

The changes to the remedy as discussed in the Explanation of Significant Differences (ESD) accurately describe the updates and decisions that have been made between USEPA, IDEM, the Midco Remedial Corporation (MRC), and its contractor AECOM. We support the modifications contained in this ESD. Please do not hesitate to contact me at (317) 232-4535 should you have any questions.

Sincerely,

Bruce A. Oertel, Chief
Remediation Services Branch
Office of Land Quality

BAO:SA:rr
cc: Rex Osborn, IDEM
ec: Pablo Valentin, USEPA

APPENDIX B

Administrative Record Index

(Only updates #7 and #8, which include the documents that serve as the basis for ESD #4, are included here; the remainder of the Administrative Record Index is available at the Site Repository)

U.S. ENVIRONMENTAL PROTECTION AGENCY
REMEDIAL ACTION

ADMINISTRATIVE RECORD
FOR THE
MIDCO II SITE
GARY, LAKE COUNTY, INDIANA

UPDATE #7
NOVEMBER 17, 2014
SEMS ID: 915309

NO.	SEMS ID	DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
1	478736	10/1/11	Environ International Corp.	U.S. EPA	2009 Annual Ground Water Monitoring Report	299
2	478737	10/1/11	Environ International Corp.	U.S. EPA	2010 Annual Ground Water Monitoring Report	3050
3	478726	10/17/11	Bow, W. & T. Ebihara, Arcadis U.S. Inc.	Midco Remedial Corporation	Site Closure Plan- Revision 2	435
4	478729	1/13/12	Ebihara, T., Arcadis U.S. Inc.	Nowotarski, A., U.S. EPA	2005-2010 Background Groundwater Statistical Analyses Report for Inorganic Constituents Exceeding Carcinogenic and Non-Carcinogenic Risk Screening Criteria	163
5	478730	4/25/12	Ebihara, T., Arcadis U.S. Inc.	Nowotarski, A., U.S. EPA	2005-2011 Background Groundwater Statistical Analyses Report for Inorganic Constituents Exceeding Carcinogenic and Non-Carcinogenic Risk Screening Criteria	92
6	478727	8/23/12	Johnston, D.K., Arcadis U.S. Inc.	Nowotarski, A., U.S. EPA	June 2012 1, 4- Dioxane Groundwater Investigation Results	62
7	478738	4/1/13	Environ International Corp.	U.S. EPA	2012 Annual Ground Water Monitoring Report	2696
8	478731	5/31/13	Coughlin, B.R., Environ International Corp.	Valentin, P., U.S. EPA	Letter Re: Approval Request for Additional Analytical Laboratory (With attachments)	980

9	478732	6/14/13	Coughlin, B.R., Environ International Corp.	Valentin, P., U.S. EPA	Letter Re: Midco Groundwater Pipeline Closure (With attachments)	12
10	478728	2/28/14	Coughlin, B.R., Environ International Corp.	Valentin, P., U.S. EPA	December 2013 Ground Water Sampling Event	49
11	478733	7/2/14	Ebihara, T., AECOM Technical Services Inc.	Valentin, P., U.S. EPA	Memo Re: Sediment Risk Assessment (With attachments)	91
12	478734	7/15/14	Coughlin, B.R., Environ International Corp.	Valentin, P., U.S. EPA	Letter Re: 2014 Annual Ground Water Monitoring Event	10
13	478735	10/22/14	White, B., Midco Remedial Corp.	Perenchio, L., U.S. EPA	2014 Annual Mechanical Integrity Testing Report (Cover letter attached)	38

U.S. ENVIRONMENTAL PROTECTION AGENCY
REMEDIAL ACTION

ADMINISTRATIVE RECORD
FOR THE
MIDCO II SITE
GARY, LAKE COUNTY, INDIANA

UPDATE #8
NOVEMBER 24, 2014
SEMS ID: 915312

NO.	SEMS ID	DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
1	915310	2/6/13	AECOM	Midco Remediation Corporation	1,4-Dioxane Natural Attenuation Model Documentation (With attachments)	57